conducted by CRA on November 16 and 17, 2004, before facility operations had ceased. The objective of the Phase II ESA was to confirm whether compound releases due to Site-related operations have occurred at concentration levels, which may have an adverse impact to human health or the environment.

As part of the Phase II investigation, CRA advanced 27 soil borings (SB1 to SB27) and selectively analyzed soil samples for chemicals of concern including lead, BTEX, MTBE and TPH. The soil borings targeted AOIs 16, 33, 34, 39, 41, 48, 49, 50, 51 and 52 and elevated concentrations of lead were reported in shallow soils in AOIs 39, 48, 49, 50, 51 and 52. Three RECs, aboveground storage tanks (REC 3), raw material and chemical storage (REC 4), and battery charging tables (REC 5), identified during the CRA Phase I were not specifically addressed in the Phase II ESA. The sampling and analytical results of the five investigated RECs are presented below and results are shown on a Figure in Appendix A.

REC No. 1 - Former USTs (AOI No. 33 and 34)

Soil boring SB-22 was advanced in the Former UST Area No. 1 (AOI 33) and one soil sample collected at 24 feet bgs. The sample was analyzed for BTEX, MTBE, and pH. Compounds were not detected at concentrations above reporting limits (RL) and the pH result was 9.1.

Soil boring SB-27 was advanced to target the Former UST Area No. 2 (AOI 34). However, this boring was drilled approximately 40 feet north of the actual former location of the USTs. A sample was collected at 22 feet bgs and analyzed for BTEX, MTBE, and pH. Compounds were not detected at concentrations above RLs with the exception of toluene detected at 0.006 mg/kg and the pH result was 8.7.

No evidence of petroleum hydrocarbon impacts above EPA Region 9 Preliminary Remediation Goals (PRGs) for residential or industrial sites was detected at either of the former UST areas.

REC No. 2 - Former lead reclamation area (AOI No. 16)

One soil boring (SB-23) was advanced to 1 foot bgs within the former lead reclamation area. One sample was collected beneath the concrete floor and analyzed for lead. Lead was detected at 5.9 mg/kg. No evidence of lead impacts above EPA Region 9 PRGs for residential (California modified) or industrial sites was detected.

REC No. 6 - Used oil processing area (AOIs No. 41 and 42)

One soil boring (SB-24) was sampled at 4 feet bgs and analyzed for BTEX and TPH. No evidence of used oil impacts above EPA Region 9 PRGs for residential or industrial sites was detected in the soil sample. Compounds were not detected at concentrations above RLs with the exception of toluene detected at 520 mg/kg.

REC No. 7 - Solid wastes (AOI No. 39)

Two soil borings (SB-19 and SB-20) were advanced adjacent to the Storm Water Retention Basin. Three samples were collected from each boring at 0, 1 and 2 feet bgs and analyzed for lead. Lead concentrations ranged from 15 mg/kg to 487 mg/kg. Lead concentrations exceeding EPA Region 9 residential site PRGs (California modified) were detected in the surface soil sample from 0 to 6 inch bgs in SB-20 adjacent to the storm water retention basin. The underlying sample from the 12 to 18 inch bgs interval did not exceed the residential PRG for lead.

REC No. 8 - Spills/releases of lead oxide dust (AOIs No. 48, 49 50, 51 and 52)

To investigate potential impacts from lead oxide dust primarily along the railroad spur and in the grassy areas CRA advanced twenty-one borings. Lead concentrations exceeding EPA Region 9 residential site PRGs (California modified) were detected at several Site areas. The areas evaluated are as follows:

- Along the railroad spur (AOI 48), particularly along the loading docks, borings SB-15, SB-16, SB-17, SB-21, SB-25, and SB-26 were advanced and samples collected from 0 to 6, 12 to 18, and 24 to 30 inches bgs. Concentrations exceeded industrial PRGs in the 0 to 6 inch interval and the 12 to 18 inch interval in this area. Lead was detected above the remediation criterion of 800 mg/kg in four samples with concentrations ranging from 3.7 mg/kg to 63,500 mg/kg.

- On the grassy area north of the northern bag collector operations and north driveway (AOI 49) borings SB-10 through SB-14 were advanced and samples collected from 0 to 6, 12 to 18, and 24 to 30 inches bgs. Concentrations exceeded industrial PRGs in the 0 to 6 inch interval in this area. Lead was detected above the remediation criterion of 800 mg/kg in three samples with concentrations ranging from 2.4 mg/kg to 8,480 mg/kg.

- On the grassy area south of the Guard House (AOI 50) seven borings SB-1 through SB-7 were advanced. Samples were collected from 0 to 6, 12 to 18, and 24 to 30 inches bgs and analyzed for lead. Lead was not detected above the remediation criterion of 800 mg/kg with concentrations ranging from 2.1 mg/kg to 538 mg/kg.

- On the grassy area south of the Main Production Building (AOI 51) one soil boring (SB-8) was advanced. Samples were collected from 0 to 6, 12 to 18, and 24 to 30 inches bgs and analyzed for lead. Lead was not detected above the remediation criterion of 800 mg/kg with concentrations ranging from 6.9 mg/kg to 286 mg/kg.

- On the grassy area in the south east corner of the property (AOI 52) one soil boring (SB-9) was advanced. Samples were collected from 0 to 6, 12 to 18, and 24 to 30 inches bgs and analyzed for lead. Lead was not detected above the remediation criterion of 800 mg/kg with concentrations ranging from 5.9 mg/kg to 600 mg/kg.

- On the gravel area in the northwest corner of the property one soil boring (SB-18) was advanced. Samples were collected from 0 to 6, 12 to 18, and 24 to 30 inches bgs and analyzed for lead. Lead was not detected above the remediation criterion of 800 mg/kg with concentrations ranging from 15 mg/kg to 114 mg/kg.

4. ENVIRONMENTAL SETTING

4.1 Location/Land Use

The Delphi former battery manufacturing facility is located at 1201 North Magnolia Avenue in the City of Anaheim, Orange County, California (Figure 1). The Site is situated in a mixed use commercial/industrial area in the center of a wider residential area. The area immediately surrounding the Site is in a developed urban setting zoned for light industrial/commercial land use. The Site is a relatively flat rectangular property with frontage along Magnolia Avenue (Figure 2) and is bordered by the following properties:

North:	Interstate 5 (I-5) and Southern California Tow Equipment;
East:	Magnolia Avenue and farther east by Wickes Furniture, American Career College, and Talbert Medical Group;
South:	Regional Occupational Program (ROP) Career & Technical Institute and office buildings;
West:	Intercem, Micel, ICEE USA, CaliWest Car Wash Systems, a vacant office/commercial buildings, Ryan Herco Pumps and L&S Screw Machines.

4.2 Regulatory Status of Adjacent Properties

No evidence of adverse impact to the Site from surrounding properties was observed by CRA during the Phase I and Phase II Environmental Site Assessments (ESAs) (CRA, 2004, 2005) and Site personnel were not aware of any adverse environmental impact to the Site from the adjacent properties. One adjacent property, 1236 North Magnolia Avenue, was identified in the EDR database report and listed as having the following occupants:

- FHP Anaheim Commercial Center, and
- Talbert Medical Group

This property was listed in the RCRIS-SQG federal list and in the California UST database as well as the California LUST report. In the LUST report, this property was listed as having a closed status.

Haley & Aldrich obtained an EDR report for the Site in October 2005. The following businesses in the vicinity of the Delphi property were identified in the report and summarized below. A copy of the EDR data base report is provided in Appendix A.

> **Century Laminators: 1225 N Knollwood Circle** (West of Site)
> RCRA LQG – 1 violation exists (unspecified) – compliance achieved in 1994. Wastes generated include oil, polymeric resin waste, oxygenated solvents, other organic solids; one active UST – unknown substance, and two former USTs – unknown substance.
>
> **Portable X-ray Labs Inc.: 1151 Knollwood Circle** (southwest of Site)
> One closed LUST site (gasoline impacted soil only). Wastes generated include photochemicals/photoprocessing waste.

IPC Cal Flex Inc.: 1255 N. Knollwood Circle (just west of Site)
RCRA SQG identified for inorganic solid waste and liquids with metals.

ICEE USA: 1330 Knollwood (northwest of Site)
RCRA SQG. The site was identified as having solutions with less than 10 percent total organic residues.

Micel Inc.: 1240 N Knollwood Circle (west of Site)
RCRA SQG. The site was identified for the following: caustic liquids, chromium, selenium, unspecified aqueous solution and liquids with metals and inorganic solid waste.

Aggressive Engineering Corp: 1235 N. Knollwood Circle (southwest of Site)
RCRA SQG: no violations. The site was identified for the following: waste oil and mixed oil, unspecified solvent mixture waste, halogenated solvent waste and the presence of USTs on-site.

Intercem Corp: 1380 Knollwood Circle (northwest of Site)
HAZNET identified waste category as "unspecified solvent mixture waste." CERCLIS identified "No Further Remedial Action Planned" and the RCRA SQG indicated "no violations." The SLIC (Spills, Leaks, Investigation and Cleanup) database indicated no other info reported in the database.

L & S Machine Enterprises: 1190 Knollwood Circle (southwest of Site)
RCRA SQG database indicated "no violations." The site was indicated to have unspecified oil containing waste and waste oil/mixed oil.

The LUST database identified the Portable X-ray Labs Inc. at 1151 Knollwood Circle (southwest of Site) as a Case closed for gasoline impacted soil only.

4.3 Local Ecology

There are no surface water bodies or water courses located on or immediately adjacent to the Site. Information obtained from EDR related to the National Wetlands Inventory database indicated that there are no wetlands areas identified within ½-mile of the Site. The closest water body to the Site is an intermittent stream, Fullerton Creek, located approximately 4,000 feet north-northwest of the Site.

4.4 Physiography, Topography, and Surface Drainage

The Site is situated within the Downey Plain part of the Coastal Plain of the Los Angeles Basin. The Downey Plain is located south and southeast of the La Brea, Montebello, and Santa Fe Springs Plains, and of the Coyote Hills, and northeast of the Newport -Inglewood Structural Zone (CDWR, 1961). It extends from Ballona Gap across the central lowland of the Coastal Plain of Los Angeles County into the Coastal Plain of Orange County nearly to Santa Ana. The Downey Plain ranges in elevation from 275 feet in the Los Angeles Narrows and 200 feet in the Whittier Narrows to sea level at the ocean near Dominguez Gap. The slope of the Downey Plain varies from 7 to 23 feet per mile, but is generally less than 18 feet per mile. It is essentially a depositional feature, although erosion periods also occurred during deposition. Alluvial fans formed by the Los Angeles, Rio Hondo-San Gabriel River and Santa Ana River systems have coalesced to form a very gentle plain. During past flood times these large rivers have meandered over most of the area depositing their debris. Near the ocean some of the stream deposited sediments are interbedded with marine and tidal sands, gravels, and clays.

The area surrounding and including the Site ranges in elevation from approximately 90 to 95 feet above mean sea level (msl) and appears to gently slope from the east toward the west. Surface drainage in the area surrounding the Site is toward the west-northwest following the general slope of the surface topography. Surface water on the Site is gathered in drains and exits the Site after passing through a stormwater retention basin. As indicated above, the nearest surface water body is Fullerton Creek, located approximately 4,000 feet downslope and northwest of the Site. Fullerton Creek joins Coyote Creek approximately 2 miles downstream from the Site. After approximately 6 miles, Coyote Creek merges with the San Gabriel River which runs for 4 miles before emptying into the Pacific Ocean. Both Fullerton Creek and Coyote Creek are concrete-lined channels with an average flow rate of 4.7 cubic feet per second (cfs). The San Gabriel River is also concrete-lined and has an average flow of 154.73 cfs. These creeks and the river appear to be used only for stormwater/wastewater discharge, including reclaimed sewage effluent. The Santa Ana River located east of the site is not concrete lined and has numerous groundwater recharge. The Site is located in a 100-year flood zone where shallow flooding occurs with an average depth of 1 foot.

Stormwater runoff from the Site (except runoff from the lawn or parking lot) flows to a stormwater retention basin. Runoff on the south en of the site flows into a gutter along the south edge of the property that flows west. This gutter then runs north along the west side of the property where it collects runoff from the west side of the site before flowing into the detention basin. A pipe takes the stormwater through a filter and into the Magnolia Avenue storm drain. The RWQBC regulates the facility's storm water runoff through NPDES No. CA0107093.

4.5 Climate

The Site vicinity lies within a region that is typically described as having a Mediterranean climate, characterized by warm, dry summers and mild winters. The Western Region Climate Center has collected climatic data at the Yorba Linda, California station (located approximately 16 miles to the northeast) from 1948 to March 2005. The mean temperature in the area ranges from 54.8 degrees Fahrenheit (°F) in winter to 74.0 °F in summer. The record low temperature was 23 °F and the record high temperature was 114 °F. The average annual precipitation is approximately 14.21 inches per year (Western Regional Climate Center, 2004).

4.6 Geologic Conditions

The Site is situated within the Los Angeles Basin which lies between the Transverse and Peninsular Ranges of southern California and was formed during the late Cenozoic (Yerkes and others, 1965). The basin contains up to 10 kilometers of marine and alluvial sediments in the center of the basin which has undergone a complex multiphase structural history. The structural evolution includes extension and strike slip faulting in the Oligocene and Miocene. During the Pliocene Epoch and Quarternary Period, the basin underwent oblique contraction, through thrusting and strike-slip faulting. The Los Angeles Basin and surrounding areas are an active tectonic region, with documented small to moderate-sized historical earthquakes. Numerous seismically active faults have been are present throughout the region.

Within the Los Angeles Basin the Site lies on the southern portion of the Central Block of the Los Angeles Basin. The Central Block is wedge shaped in plan view and is bounded by active fault zones. The block extends approximately 55 miles from the Santa Monica Mountains on the northwest to the south end of the San Joaquin hills to the southeast. The block is approximately10 miles wide at the northwest end and broadens to 20 miles wide at the southern terminus. Sediments within the block have been folded into parallel, northwest-trending anticlinal and synclinal structures.

Information regarding geologic conditions at the Site was initially reviewed in Phase II ESA documents and refined and expanded based on field boring logs obtained during CCR and FI field sampling programs of 2005 and 2006. The upper most soil (surface to 10 feet deep) on the Site was reported to consist of unconsolidated horizons of silty sand, sand, sandy silt and silt. Distinctive clay horizons were noted at 7 feet, 15 feet and 22 feet below the ground surface in deeper borings. The surficial soils were described as generally dry to slightly moist, various shades of brown loose to dense for sands and soft to hard for silts and clays. Copies of boring logs are included in Appendix I.

4.7 Hydrogeologic Conditions

The Site is located in the upper reaches of the Lower Santa Ana River Basin of Orange County, California. The groundwater basin beneath the Site consists of approximately 3,500 feet of interbedded sedimentary units representing multiple aquitards and aquifers with varying individual thickness and lateral extensiveness. The groundwater basin receives its recharge mainly from surface water brought into the region by the Santa Ana River, which has its origin in the San Bernardino Mountains. At its closest point, the Santa Ana River is approximately 5 miles east of the site. Groundwater within the basin is used by many municipal water agencies as a potable water source.

The soils immediately below the Site are classified as belonging to the Bellflower aquitard unit of the Lakewood Formation. Literature indicates that there are three regional groundwater-bearing units underlying the Site: the upper, middle, and lower units. The upper system occurs in stream terrace and older alluvium deposits which extend from ground surface to 700 feet bgs. Discontinuous layers may cause hydraulic continuity between the ground surface and the Talbert aquifer. Depth to the Talbert aquifer beneath the Site is approximately 120 feet bgs. The middle system appears to be confined and occurs at approximately 700 to 2,000 feet bgs and consists of multiple layers of sands and gravel deposits. The Main aquifer of the middle system occurs at approximately 700 feet bgs. The lower aquifer system is comprised of Pleistocene and older sediments. It occurs at approximately 2,500 to 3,800 feet bgs, in conglomerate, sandstone, and siltstone (CDWR, 1964, 1965).

Soil borings performed during this investigation reported interlayered horizons of silty sand, sand, silt and clay to depths of 25 feet bgs. Soil below 25 feet extending to the groundwater table generally consisted of sand with interlayered horizons of silt. Lines of geologic profiles are shown on Figure 3-1 and the geologic profiles are shown on Figures 3-2 and 3-3. Groundwater was encountered at approximately 28 feet bgs beneath the Site during the 2005 site investigation activities summarized herein. Groundwater flow is reportedly in a westerly direction beneath the Site.

The City of Anaheim's well No. 12 is the nearest potable well to the Site and is located 0.75 mile southeast of the Site (Cal-EPA, 1992). This well is reportedly screened from 450 to 498 feet bgs and is one of 36 wells in the City of Anaheim's system. The City of Anaheim uses 70 percent groundwater and 30 percent Metropolitan Water District (MWD) water, blended from Colorado River Water, state water, and treated water from Lake Matthews to provide drinking water service to 53,769 connections. Well No. 16 is located 1.8 miles east of the

Site and is screened from 384 to 414 feet bgs. Well No. 106 is located 1.8 miles southwest from the Site and is reported to be screened between 182 to 202 feet bgs, 210 to 224 feet bgs, and 540 to 560 feet bgs.

The adjacent City of Fullerton obtains 60 percent of its drinking water from a system of 12 municipal wells and 40 percent from the MWD. Water from these sources is not blended. Water from the MWD serves the northern part of the city, while local groundwater serves the southern part. Groundwater serves an estimated population of 66,000 (60 percent of Fullerton's population of 110,000). Although the Fullerton wells are interconnected, they are usually dedicated to one of four service zones. Each of the City's wells taps the upper aquifer. The nearest Fullerton municipal well, airport well No. 9, is located upgradient approximately 1.5 miles northwest of the Site.

The Bastanchury Water Company owns a well located 2.3 miles northeast of the Site which produces approximately 5,000 five-gallon bottles of water per day (Cal-EPA, 1992).

The City of Buena Park has a well, located approximately 2.5 miles northwest of the Site which is blended with MWD water to serve 65,000 people (EPA, 1992).

The Site used municipal water for drinking water and an on-site well for watering the lawn. The production well was reportedly at the north end of the site in the grassy area to the north of the Main Production Building near the large water tank. No records pertaining to abandonment of this were discovered during this investigation and no evidence of the well was found.

4.8 Groundwater Monitoring System

As part of the CCI and FI, twelve 2-inch-diameter Schedule 40 PVC monitoring wells were installed at the Site between August 2004 and July 2006. Monitoring wells (MW-1, -2, -3, -4, -5, -6, -7, -8, 8D -9, -10, -11) were advanced to between 41 and 48 feet bgs with 15 feet of 0.010 slot well screen, with one well (MW-8D) screened from 73.75 to 78.75 feet bgs to evaluate groundwater quality at depth (Figure 5). The well construction details are presented in Table 2. The monitoring wells were developed after 72 hours and groundwater sampling was performed once at each well. A summary of the monitoring well construction details are provided in Section 5 of this report. The wells were sampled on 17 August 2005, 3 February 2006, and 17 July 2006 and the samples submitted for laboratory testing. The results of groundwater monitoring are presented in Section 6.5.27. Depth to groundwater was reported between 21 and 27 feet bgs and the direction of flow was in a westerly direction.

5. SAMPLING ACTIVITIES AND PROCEDURES

This section describes Haley & Aldrich's methods and procedures for performing soil gas, soil, and groundwater sampling activities at the Site to assess AOIs identified during the review of previous Site investigations, site reconnaissance, and the operational history of the facility. Haley & Aldrich performed this field investigation between 11 August 2005 and 22 August 2006. Concrete chip and core data was collected through 26 September 2006. A site plan showing the overall facility layout with building locations, primary interior features, and locations of AOIs is shown on Figure 2. The locations of the sampling points are shown on Figure 4 and monitoring wells on Figure 5.

Samples were collected and handled in general accordance with procedures and guidance documents approved by the DTSC as specified in this section, and in the Quality Assurance Project Plan (QAPP), included in the CCR as Appendix E (Haley & Aldrich 2006). In addition, preparation for and performance of the field sampling program adhered to the guidelines presented in the Health and Safety Plan (HASP), included in the CCR as Appendix D (Haley & Aldrich 2006). The soil, soil gas, groundwater, and concrete sampling programs are summarized in Tables 4 through 7. Copies of completed sample chain-of-custody (COC) forms are included with laboratory reports on CDs for soil, soil gas, groundwater and concrete samples included in Appendices C, D, E and Appendix F, respectively.

5.1 Pre-field Activities

Prior to commencing with the field program, field scoping meetings were held with the DTSC Project Manager to discuss the identification of AOIs and the proposed sampling strategy. Additionally, meetings were held with the Site demolition contractor (Aman Engineering Construction) to coordinate sampling activities with demolition plans and develop an overall Site communication protocol and ensure compliance with health and safety requirements.

5.2 Human Health Risk Assessment and Derivation of Cumulative Risk-Based Remediation Criteria

A human health risk assessment (HHRA) was performed for the Site to

1. Assess potential human health risks to future onsite receptors, and

2. Use this baseline risk evaluation to derive cumulative risk-based industrial use remediation criteria for the Site.

<u>Summary of Human Health Risk Assessment</u>

The HHRA is presented in Appendix G, and is summarized below. For the purposes of this HHRA, it was assumed that the Site would be redeveloped for commercial/industrial uses. The receptors identified in the HHRA are those that could potentially have the greatest exposure to onsite impacts. These receptors are the future onsite construction worker and the commercial/industrial worker.

The risk evaluation was conducted following relevant U.S. Environmental Protection Agency (EPA), California Department of Toxic Substance Control (DTSC), and Office of Environmental Health Hazard Assessment (OEHHA) guidance, and using reasonable worst-case exposure assumptions. The primary guidance documents used are as follows:

- *Use of California Human Health Screening Levels (CHHSLs) in Evaluation of Contaminated Properties*, prepared by Cal-EPA, and dated January 2005 (Cal-EPA, 2005).

- *Human-Exposure-Based Screening Numbers Developed to Aid Estimation of Cleanup Costs for Contaminated Soil*, prepared by the California Office of Environmental Health Hazard Assessment (OEHHA), and dated November 2004 (revised January 2005) (OEHHA, 2005).

- *Preliminary Endangerment Assessment (PEA) Guidance Manual*, prepared by the Cal-EPA Department of Toxic Substances Control (DTSC), and dated January 1994 (revised June 1999) (DTSC, 1999).

- *Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part A), Interim Final*, prepared by EPA, and dated December 1989 (EPA, 1989).

- *Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites*, prepared by EPA, and dated December 2002 (EPA, 2002).

- *Interim Final Guidance for the Evaluation and Mitigation of Subsurface Vapor Intrusion to Indoor Air*, prepared by DTSC, and dated 15 December 2004, revised 7 February 2005 (DTSC, 2005).

It was conservatively assumed in the HHRA that each of the potential future onsite receptors would be exposed, over their entire exposure duration, to the maximum concentrations of Site-related chemicals (chemicals of potential concern [COPCs]) no matter where they occurred at the Site. The exposure duration for a commercial/industrial worker was assumed to be 25 years, and for construction worker was assumed to be 1 year.

Human health risks were calculated based on assumptions regarding potential exposures to noncarcinogens and carcinogens. With the exception of lead, total risk from potential exposure to noncarcinogens is quantitatively expressed as a total hazard index (HI). The Cal-EPA and EPA typically default to a total HI of 1.0 as an acceptable target noncancer risk threshold. This noncancer risk threshold was used in this HHRA as the acceptable total HI to assess whether exposure to COPCs at the site may pose an adverse noncarcinogenic affect.

For the evaluation of exposure to lead, an acceptable blood lead level threshold was established based on the preliminary remediation goal (PRG) developed using Version 7 of the DTSC Lead Risk Assessment Spreadsheet (LeadSpread) Model and the EPA Region IX industrial soil PRG developed using the EPA Integrated Exposure Uptake Biokinetic Model for Lead (IEUBK).

Total risk from potential exposure to carcinogens is quantitatively expressed as a cumulative incremental lifetime cancer risk (ILCR). Cumulative ILCRs of 10^{-6} to 10^{-4} correspond to theoretical probabilities of 1 chance in 1 million to 1 chance in ten thousand, which is in addition to or in excess of the background cancer risk. Within this range, the Cal-EPA and EPA typically default to an acceptable cumulative ILCR threshold of 10^{-5} in risk management decision-making in commercial/industrial land use scenarios. In addition, California Proposition 65 (Safe Drinking Water and Toxic Enforcement Act of 1986, Proposition 65, Health and Safety Code Section 25249.5 et seq.) requires specific notification and warning for exposure to carcinogens above the "no significant risk level", which is based on a 10^{-5} excess lifetime cancer risk. This value was used in this HHRA as the acceptable cumulative ILCR to assess whether exposure to COPCs at the Site may pose an unacceptable cumulative ILCR.

<u>Cumulative Risk-Based Remediation Criteria</u>

The above risk assessment thresholds were exceeded in the HHRA for both future onsite receptors. The COPCs with a maximum concentration or a 95 percent upper confidence limit of the mean (95%UCL) concentrations that contributed the most to the risk threshold exceedances were identified. These concentrations were lowered in the risk assessment calculations until the risk thresholds were met. These lowered concentrations were identified as the target exposure point concentrations from which cumulative risk-based remediation criteria were derived, with the exception of arsenic. An additional evaluation was conducted to assess the potential of leaving "hot spots" of arsenic impacted soil at concentrations greater the maximum Site-specific background concentrations for arsenic. Based on that evaluation, the cumulative risk-based arsenic remediation criterion was lowered from 21.9 mg/kg to 9.05 mg/kg.

The initial remediation criterion developed for lead using the LeadSpread Model was 6,650 mg/kg, based on the post-remediation calculated 95%UCL concentration. However, Delphi has decided to set the remediation criteria to 800 mg/kg as the remediation criterion for lead at the Site to be consistent with the EPA Region IX industrial soil PRG.

The remediation criteria are presented in Table 3.

5.3 Soil Gas Sampling

Soil gas samples were collected at AOIs previously identified as areas where VOCs may have been used or accidentally released. A total of 257 soil gas samples were collected (including field duplicates and duplicate Summa canister confirmation samples) at 129 locations throughout the Site. Prior to initiating full scale sampling across the site, a standard purge volume test was performed on the first day of sampling to determine the optimum purge volume. The purge volume test was performed by collecting one purge volume, three purge volumes and seven purge volumes at the initial sample point. Based on this testing it was determined that seven (7) purge volumes provided the optimum analytical recovery for this site.

5.3.1 Soil Gas Sampling Rationale

Sample depths at these initial boring locations were selected based on the type of historical operations associated with each AOI. In general, sampling was performed in accordance with the January 2003 Advisory Active Soil Gas Investigation jointly issued by the DTSC and the Los Angeles RWQCB at 5 feet bgs, and a second sampling depth of 15 feet bgs was included at locations where VOCs were deemed likely to extend to greater depth (for example, near former locations of USTs). A summary of the field sampling program for soil is presented in Table 4.

Step-out soil gas sample collection was performed in proximity to initial soil gas boring locations where analytical results initially detected VOCs or indicated that the horizontal or vertical extent of VOC concentrations had not been delineated. This process was performed iteratively until analytical results indicated the lateral extent of on-site soil vapor impacts was less than the delineation criteria or decreasing trends were evident. Likewise, step-down sampling was performed to define the vertical extent of soil vapor impacts at locations where VOC concentrations were greater than the delineation criteria or decreasing trends were not evident. Where step-out sampling was performed, these boring locations were typically placed in a triangular or rectangular pattern approximately 10 to 15 feet out from the previous investigation limits. A summary of the soil gas sampling program is provided in Table 5 and sampling locations are shown on Figure 4.

5.3.2 Soil Gas Sampling Procedures and Analytical Methods

Soil gas samples were collected by either Interphase, Inc. or H&P Mobile Geochemistry and analyzed by multiple environmental laboratories (American Analytics, American Environmental Testing Laboratory, Centrum Analytical Laboratory, H &P Mobile Geochemistry, and Jones Environmental) in a manner consistent with the 20 January 2003 Advisory Active Soil Gas Investigation jointly issued by the DTSC and the Los Angeles RWQCB. A summary of pertinent procedures related to the installation and sampling of soil gas probes is presented below:

- Direct-push (Geoprobe ™ or Strataprobe™) rods, approximately 1-inch or 1.75-inch-diameter, were driven to the desired depth and removed using a direct-push installation rig. A non-reactive, 1/4-inch-diameter, polyethylene tubing with a filter implant attached to the end was then inserted down the bore hole. A 1-foot thick sand pack was put around the filter. Thereafter, granular bentonite was placed and hydrated to form a seal from the top of the sand pack to ground surface. After hydrating, the bentonite seal material was allowed to expand to adequately seal the probe prior to sampling.

- The site-specific purge volume test results determined prior to the start of sampling were used as the standard for the investigation. Based on the results of the purge volume test performed during this investigation, seven purge volumes were used during the soil gas sampling program.

- Samples were collected by drawing the soil gas into 125 milliliter (ml) glass bulbs using a SKC Model 224-PCxR4 (or equivalent) personnel sampling pump controlled by a Dwyer RMB-SSV (or equivalent) (range 0-500 milliliters per minute [ml/min]) rotometer set at a flow rate of 200 ml/min. Confirmation soil gas samples were collected in Summa canisters at 10 percent of the sampling locations. The syringe-collected soil gas samples were analyzed by a California-certified mobile laboratory by EPA Method 8260B. The Summa canisters were sent to a California-certified stationary laboratory following standard COC procedures and were analyzed by EPA Method TO-14. Table 5 summarizes the analytical methods selected for soil gas samples collected at selected AOIs.

5.4 Soil Sampling

Soil samples were collected at AOIs previously identified as areas where Site-related chemicals may have been released and other suspect areas, such as a loading dock or just to verify no impacts were present such as in the parking lot area. A total of 1,793 soil samples and step-out samples (including 156 field duplicates) were collected at 601 locations throughout the Site, including X-ray fluorescence (XRF) sampling for lead in perimeter areas. Of the 1,793 samples, 384 soil samples were collected for XRF testing from 178 locations in the perimeter, primarily from lawn and railroad spur areas.

5.4.1 Soil Sampling Rationale

In general, to evaluate potential lead impacts, samples were collected from the ground surface to 4 inches, 8 to 12-inches, and 14 to 18 inches bgs at most locations. Where data supported obtaining deeper samples or alternative sampling strategies, deeper or different sampling horizons were selected. Soil sampling locations (including XRF sampling) are shown on Figure 4. Soil samples collected within each AOI were analyzed as indicated in Table 4. The selection of analytical methods within individual AOIs was based on the historical operational history, site observations and the results of previous Site investigations.

Sample depths at the initial boring locations were selected based on the type of historical operations associated with each AOI and potential chemical transport mechanisms such as liquid waste or dry waste. In general, sampling was performed just below the surface (0 to 4 inches), 8 to 12 inches, 14 to 18 inches and at 5 feet bgs if samples for analyses such as for VOCs were collected. Where deeper borings were advanced, additional samples were collected (for example, 10, 15 and 20 feet bgs). Specific sampling intervals for each boring location are identified in Table 4. For most impacted areas, step-out borings were performed in proximity to initial soil boring locations where analytical results indicated chemical concentrations were greater than the remediation criteria or decreasing trends were not evident. This process was performed iteratively until analytical results indicated the lateral extent of soil impacts was considered delineated (i.e., concentrations are less than the remediation criteria, decreasing trends were evident, or where surface staining or other evidence of a release appears to define the extent of impacts). Likewise, step-down sampling was performed to define the vertical extent of chemical impacts at locations where chemical concentrations were greater than the delineation criteria or decreasing trends were not evident. Where step-out sampling was performed, locations were typically placed in a triangular pattern approximately 5 to 20 feet out from the previous investigation limits. The soil sampling locations are shown on Figure 4.

5.4.2 Soil Sampling Procedures and Analytical Methodology

Direct-Push / Stationary Laboratory Testing - Soil sampling was conducted using a truck-mounted direct-push rig (Geoprobe™/ Strataprobe™). The direct-push rig advanced Macrocore barrels (2-inch outside diameter) containing acetate lined sample sleeves (1.75-inch) to desired depths using a hydraulic ram or pneumatic hammer system. The direct-push sampling rod was decontaminated between sampling events as outlined in Section 5.7.

The soil types were observed by a field geologist and logged in general accordance with the Unified Soil Classification System (USCS). Soil samples were preserved by placing Teflon™ sheeting over the ends of the soil filled acetate liners and then capping the samples with polyethylene caps, leaving no headspace. Samples were then appropriately labeled with the sample number, sample depth, and the date and time sampled. Samples were then placed in sealable plastic bags and immediately placed in an ice-filled cooler for transferal to a California-certified stationary laboratory under standard COC procedures.

Selected laboratory submitted soil samples were analyzed by specific EPA Methods based on the historical processes and chemicals used in the AOI. Table 4 summarizes the analytical methods selected for soil samples collected at each AOI.

X-Ray Fluorescence Lead Testing - Soil samples were collected for lead analysis in the field using XRF technology. PCR Mobile Laboratory (PCR) conducted the XRF testing using a Niton 309 XRF Analyzer. In addition, 10 percent of the soil samples subjected to XRF testing were collected and analyzed as confirmation sample at a stationary California-certified analytical laboratory, American Environmental Testing Laboratories, Inc. (AETL) following EPA Method 6010B. Soil sample locations were selected in unpaved perimeter area AOIs such as the lawn and railroad spur. The soil samples were collected in general accordance with the guidelines provided by the DTSC in *Interim Guidance for Evaluating Lead-Based Paint and Asbestos-Containing Materials at Proposed School Sites* (DTSC, 2001).

Similar to as noted above, each soil sample obtained for XRF testing was collected using direct-push technology. Samples were collected in acetate sleeves, labeled and preserved. The direct-push sampling rod was decontaminated between sampling events as outlined in Section 5.7. Confirmation samples were obtained from the same section of sleeve extracted for XRF testing and placed in a laboratory-provided glass sample jar. The glass jar was then labeled and placed into a plastic zip-lock bag and stored in a cooler containing ice prior to being picked up and delivered to a California-certified stationary laboratory by courier the next day. Samples were transported to the laboratory or on-site XRF instrument field technician following standard COC procedures.

5.5 Concrete Sampling

Concrete samples were collected at previously identified AOIs or areas where visible staining was observed. These included concrete chip samples and concrete cores collected from targeted areas. Initial investigations by Earth Tech and Pivox collected chip samples of concrete from biased locations targeting lead process areas and a site-wide grid. However, because core samples were needed to characterize concrete for disposal, Haley & Aldrich collected core samples of concrete from process areas where chips showed elevated concentrations of lead and from stained areas identified during demolition oversight activities. Locations of concrete chip and concrete core samples are shown on Figure 7-1 and 7-2.

5.5.1 Concrete Sampling Rationale

To supplement concrete sampling performed by Earth Tech and Pivox, initial chip samples were collected from the surface at locations of pink to purplish-stained concrete. In areas where analytical results showed chemical concentrations above the Site's remediation criteria, additional chip samples were collected as step-outs to delineate these areas. Step-out locations were approximately 10 feet out from previously sampled locations.

Concrete cores were collected in AOIs as well as areas of stained concrete to obtain additional information on the quantities of impacted concrete on the Site.

In general, the sampling and subsequent analytical testing was performed to assess Site conditions as well as assist in profiling stained areas for potential disposal.

5.5.2 Concrete Sampling Procedures and Analytical Methodology

Chip sampling was conducted by chipping pieces of the concrete surface and placing the pieces of broken concrete into individual sealable plastic bags. Any large pieces (greater than 1 ¼-inch diameter) were broken up and placed back into the bag.

Core samples were collected using an electric powered 1 or 1 ¼-inch concrete core drill. The cores ranged in length from 6 inches to 12 inches depending on the thickness of the concrete slab at that particular location. The chips and cores were labeled with a sample number, depth, and the date and time of sample collection. Samples were immediately placed into an ice-filled cooler for delivery to a California-certified laboratory following standard COC procedures.

Concrete samples were analyzed for California Code of Regulations (CCR) Title 22 metals by EPA Methods 6010B and for mercury by 7471A, Polychlorinated bi-phenols (PCB)s by EPA Method 8082, Semi-volatile Organic Compounds (SVOCs) by EPA Method 8270C, and total petroleum hydrocarbons (TPH) by EPA Method 8015M-CC. Selected concrete samples were also analyzed for leachable concentrations of lead, as soluble threshold limit concentration (STLC) and toxicity characteristic leaching procedure (TCLP).

5.6 Groundwater Sampling

Groundwater samples were collected to assess overall groundwater quality across the Site and at specific AOIs (26, 39, 41 and 47) identified during field activities as areas where chemical releases may have impacted groundwater. A total of 12 monitoring wells including a deep zone well (MW-8D) were installed, including ten onsite and two offsite. Three groundwater sampling events were performed during the Site investigation activities. Samples were analyzed for VOCs, CAM-17 metals, and/or pH (Table 6). The wells were installed following standard requirements defined in Bulletin 74-81 (1981) and 74-90 (1990) of the California Department of Water Resources and permits issued by the City of Anaheim Department of Public Utilities Environmental Services Division. Copies of permits, boring logs, well development records, and sampling purge logs are provided in Appendix H. Monitoring well locations are shown on Figure 5.

5.6.1 Sampling Rationale

During August 2005, Haley And Aldrich installed four shallow groundwater monitoring wells (less than 50 feet bgs) around the perimeter of the Site to estimate gradient and flow direction and collect groundwater samples and evaluate groundwater quality near AOIs 34, 41 and 47. The borings were advanced to between 41 and 47 feet bgs with well screens placed in the lower 15 feet of each boring. Wells were constructed of Schedule 40 PVC with a well screen slot size of 0.010 inches. The filter pack consisted of No. 2/12 Monterey Sand. Two to seven feet of bentonite chips (bentonite seal) was placed above the filter pack. Bentonite–Portland cement grout was placed from the top of the seal to just below the ground surface. A flush mounted, traffic rated, concrete–steel vault was placed around the well at the surface. The wells were developed after 72 hours and samples were subsequently collected and sent to a California-certified laboratory for analyses.

To assess whether groundwater quality had been impacted by chemicals detected in soil in at AOIs 25 and 26, four grab groundwater samples were initially collected by Haley and Aldrich for screening purposes using direct-push grab sampling methodology on 18 October 2005. The grab samples were collected downgradient from AOI 26 (Maintenance Area) and AOI 25 (Hazardous Materials Area) in the northeast corner of Warehouse No. 3.

Based on the results from the grab samples that indicated the presence of VOCs in groundwater, six wells (MW-5 through MW-9 and MW-8D), including one deep zone well (MW-8D), were installed along the north west-central part of the site, near the west wall of Warehouse No. 3 between 31 January 2006 to 2 February 2006. These wells were installed to depths between 47 and 55 feet bgs with well screens placed at the bottom 15 feet. Deep well MW-8D had a five foot screen placed from 73.75 to 78.75 feet bgs just above a potential fine grain confining layer to evaluate the potential for VOC impacts at depth within the aquifer

Based on the results of samples from the six onsite wells, two offsite monitoring wells (MW-10 and MW-11) were installed by Haley and Aldrich in the street west of 1240 North Knollwood Circle on 14 July 2006 to assess potential impacts in groundwater downgradient. An Encroachment License and Right of Way Construction Permit were issued from the City of Anaheim Department of Public Works to install the wells in a public right of way. Borings were advanced to 44 and 45 feet bgs with 15 feet of well screen placed at the bottom of each well.

Based on the results of samples from the two offsite wells (MW-10 and MW-11) the limits of VOCs in groundwater could not be adequately delineated. Therefore, DTSC requested further assessment offsite and an additional five groundwater grab sample points (HP0001 through HP0005) were placed approximately 400, 550, 700, 850, and 1000 feet down gradient from the source area and south of wells MW-10 and MW-11 on the 1200 block of N. Knollwood Circle. Grab samples were collected at approximately 30 feet bgs in all five points and at 50 feet bgs in points HP0001 and HP0002.

Soil samples were collected during the installation of monitoring wells and analyzed for COPCs. Discussions of these results for wells MW-5 through MW-11are included in the soil section for AOI 26. Soil results from wells MW-2 and MW-4 are included in the soil sections for AOI 41 and AOI 47, respectively.

5.6.2 Groundwater Sampling Procedures and Analytical Methodology

Monitoring Wells - Haley & Aldrich personnel performed groundwater purging and sampling at the Site on 16 August 2005 for MW-1 through MW-4, 3 February 2006 for MW-5 through MW-9, and 17 July 2006 for MW-10 and MW-11. The eleven groundwater monitoring wells were gauged within a single 24-hour period with the same water sounding tape following decontamination between gauging locations. Prior to sampling each monitoring well, depth to groundwater was measured in each well to the nearest one-hundredth of a foot using an electronic water level sounder. Data from the well gauging was recorded on a Well Gauging Data Sheet. Data included depth to bottom of well and depth to groundwater from top of casing. Monitoring well vapor concentrations were measured with a photo-ionization detector (PID) following the removal of the well cap, and results were recorded on the Well Gauging Data Sheet. Estimated groundwater elevation contours derived from depth to water measurements are shown on Figure 6. Monitoring records are included in Appendix H.

Monitoring wells MW-1 through MW-4 and MW-10 and MW-11 were purged using a Grundfos pump and sampled using disposable bailers. Monitoring wells MW-5 through MW-9 were purged and sampled using a low-flow bladder pump with dedicated tubing. Samples for metals were filtered using 0.45 μm membrane filters.

Purging was performed at a pumping rate of approximately 200 to 400 ml/min (i.e., 0.05 to 0.11 gallons per minute [gpm]) to keep drawdown of less than 1.0 foot during the purging operation. During purging, the water quality parameters were recorded approximately every 5 minutes utilizing a flow-through cell to measure specific conductivity, pH, dissolved oxygen (DO), oxidation reduction potential (ORP), temperature and turbidity. Wells were purged until the following criteria were met:

- Turbidity ±10%, with final reading less than 10 nephelometric turbidity units (NTUs)
- Specific Conductance ±3%
- pH ±0.1
- Dissolved Oxygen (DO) ±10%
- Oxidation Reduction Potential (ORP) ± 10%
- Temperature ±1 degree Celsius
- Purging continued until the parameters were relatively stabile for three successive measurements to the values listed above, or three well volumes had been removed (defined as the volume of water in the casing from the bottom of the well casing to the top of the water column):

At completion of purging, the pump discharge tube was disconnected from the flow-through cell. A total of 14 groundwater samples (including two duplicates) from the three sampling days were collected by lowering a disposable bailer through the well casing or from the low-flow tubing. Samples were collected in appropriate containers, labeled, and placed in a chilled container for transport to a California-certified laboratory following standard COC procedures.

Non-dedicated equipment (pump, tubing and water level indicator) was decontaminated between each sampling well location.

Groundwater samples were analyzed by one or more of the following EPA Methods (Table 6):

- VOCs by EPA Method 8260B
- CAM-17 Metals by EPA Method 6010B/7470A
- pH by EPA Method 150.1

Step-out Groundwater Grab Sampling - Collection of groundwater grab samples was accomplished using a direct-push rig. The sampling tool was pushed to the